# METHODS FOR SATISFACTORY FIELD WORK IN THE GENUS RUSSULA

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There are undoubtedly many unreported and undescribed species of *Russula* in the United States. While it is true that the color variations in the same species and the absence of striking characteristics make the identification more difficult than in some genera, the proper study of the species in the field will overcome this difficulty to a large extent. When one is collecting in a rich field, there is always a temptation to sacrifice the quality of the work to the quantity of material taken. But one should remember that five collections of *Russula* with complete field notes are of more value than any number of specimens without full descriptions.

The first essential in collecting is to keep each collection separate. One method is to put each collection in a paper bag of proper size; another, used by the Boston Mycological Club, consists in wrapping the specimens in waxed paper. Each number should be acompanied by a statement of the locality, date, habitat and habits of growth. When possible it is desirable to obtain subsequent collections from the same place so as to accumulate data as to the season of growth, and any variations in color, size, or habit.

The most important fact to be learned in the field is the character of the *taste*. . Both young and mature mushrooms should be tasted. I have found it preferable to taste the pileus rather than the stipe, since when the context is only slightly acrid the taste is more pronounced in the pileus. While it is advisable to taste cautiously at first lest the context prove to be very acrid, one should chew enough to determine beyond question whether the taste is acrid, mild, astringent, bitter, or in any way disagreeable.

While examining the context one should also observe whether the broken flesh changes color. This change is not always rapid.

Sometimes it requires two minutes. If the color then persisted, there would be no special need to watch the changes occur, but in several cases a secondary change occurs which obscures the first discoloration. Prof. H. C. Beardslee, of Asheville School, Asheville, N. C., seems to have been the first one to publish any record of an intermedate change to red in *Russulae* outside of the group to which *Russula nigricans* (Bull.) Fr. belongs. In Mycologia 6:91. 1914 he described *R. rubescens,* which differs from *Russula obscura* Rom. in that the wounds become *red* and then gray or black. In the summer of 1916 I determined to look for intermediate color changes in the flesh of all *Russulae.* I found that specimens exactly like what I had formerly referred to *R. obscura* Rom. showed within two minutes after the flesh had been broken a change to peach-red, but that after about five minutes the wounds had become gray. Prof. Beardslee says in regard to specimens of these which I sent him: "They seem to be the same as my *R. rubescens.*" Miss Ann Hibbard, a member of the Boston Mycological Club who spent part of the summer collecting with me, observed the same change to red and then to gray in the broken flesh of a yellow *Russula* conforming in all other respects to *R. flava* Lindbl. The question has naturally arisen, does the flesh of *R. flava* become red, then gray, and I am awaiting an answer to this question from Prof. Romell before pronouncing this a new species. In October Miss Hibbard wrote me from Boston: "There were two more *R. rubescens* at the club exhibition yesterday which were called *R. obscura,* but the stems turned red when I scratched them." Since in other characteristics *R. rubescens* often resembles *R. obscura,* it is mostly impossible to tell whether herbarium material which has been identified as *R. obscura* is this species or *R. rubescens.* Enough has been said to show the importance of the most careful observations regarding the change of color in the broken flesh.

The color of the lamellae in both young and mature specimens should be ascertained, as in some species the color of young lamellae is yellow while in others it is white at first, becoming yellow with maturity. The arrangement of the lamellae affords a permanent characteristic which can be used in classification,

but this can be seen much plainer in the fresh specimen than in the dried state. In some all the lamellae reach the stipe and are simple; in others shorter lamellae are promiscuously scattered among the long ones; in others the short and the long lamellae are systematically arranged. Sometimes lamellae fork near the stipe only, and sometimes they fork once or twice midway to the margin. When the time at one's disposal is short these characteristics may be left to observe in the dried state if the mushrooms are properly dried.

It is, of course, necessary to describe the color of the pileus while the mushrooms are fresh. Not only may the color change during one night after they have been collected, but the color of the dried specimens is often very different from that of fresh ones. Water-color sketches of *Russulae* have great value in expressing the color. One who is collecting fleshy fungi should follow some standard color nomenclature in describing the color. While the color of some species varies through a wide range, there is generally a certain key note of color, as it were, throughout the variation, or certain limitations in variation from which one learns in time to recognize the species. Again there is some other constant characteristic which distinguishes a species in spite of the color variation, as the odor and sordid discoloration of *R. atropurpurea* Pk., or the slight odor and soapy or sticky feeling of the stipe of *R. Mariae* Pk. While studying the color of the pileus one should determine to what extent the cuticle can be peeled off, and a specimen showing the result of this attempt should be included in the collection. Whether the surface is viscid or not is important and can be best observed in the field. The glabrous, pruinose, tomentose, or areolate character of the surface may be permanent, or the surface may change with age or with drying, so that it is advisable to observe the surface of the young and mature specimens in the fresh state.

Of as great importance as the taste and the changing color of the context is the spore color. Sometimes it is difficult to obtain a spore print after specimens have been brought in, and in order to be sure of a satisfactory print, it is a good plan to place a mature pileus on a piece of clear white paper when the plants are

put in the bag in the field. By the time one is ready to study the specimen at home a good print will probably have formed. To be satisfactory, a thick layer of spores should have fallen and the color should always be described from such a layer, as otherwise ochraceous spores may seem pale when only a few have fallen. If only a scattering of spores can be obtained, one may scrape some up with the point of a knife and rub them off in mass on the paper. The spore print should then be folded and either pinned to the description or placed in a small envelope bearing the collection number. Before the print has been kept very long the color should be named according to some standard of color nomenclature, since the spore color may change in time, although if a fixative has not been used there is less danger of this.

There are some general suggestions which may be given. Not only is it important to keep collections in the field distinct, but they must not be mixed during the drying process. They should be tagged with the identification number before placing on the drying screen. As soon as they are thoroughly dried each collection should be wrapped or boxed. I have found that specimens properly dried and taken care of in this manner keep perfectly without the addition of naphthalene. In any case it is preferable not to add the naphthalene until after the specimens have been identified, as it obscures any natural odor which the plants may have. In regard to odor, one should examine the mushrooms in the field, when drying, and after they are dried to detect any characteristic odor.

It is a mistake to assume upon a glance in the field that one group of *Russula* is the same as another taken in some other place or at another time and to limit the description of it to "the same as No. x," since one may be mild, the other acrid; one may have white spores, the other yellow spores; one may have persistently white flesh, the other flesh changing from red to gray or merely to gray. Neither is it a good plan to make a composite description of a lot of fresh mushrooms assuming them to be the same. Each collection should have its own description and if all the descriptions agree in the essential points and the fresh mushrooms

of the different collections as well as the dried ones also agree, then one can arrange a complete description of the species from the descriptions of the various collections taken either the same day, or the same year, or even in different years.

To summarize, each collection of *Russula,* to be of value, should include a number of specimens, where possible, showing a gradation from young to mature forms and any variations in color or size, one which shows to what extent the cuticle is separable, and a lengthwise section. Accompanying the specimens should be a spore print, and a description containing the points outlined above. To these a water-color sketch would be a valuable addition.

Many of the species of *Russula* are edible and occur in some abundance through July and August and the early part of September. For the benefit of any who may wish to attempt to identify species of *Russula* which they may find, I append a short bibliography of American literature on the genus.

BIBLIOGRAPHY

**Burlingham, G. S.** Russula. North American Flora **9**: 201–237. 1915.

**Kauffman, C. H.** Michigan Species of Russula. Rep. Mich. Acad. Sci. **11**: 55–91. 1909.

**Murrill, W. A.** Illustrations of Fungi. Mycologia **4**: 166, 289–293. 1912; **7**: 167, 224. 1915; **8**: 121–124. 1916.

**Peck, C. H.** New York Species of Russula. Bull. N. Y. State Mus. **116**: 67–98. 1907.